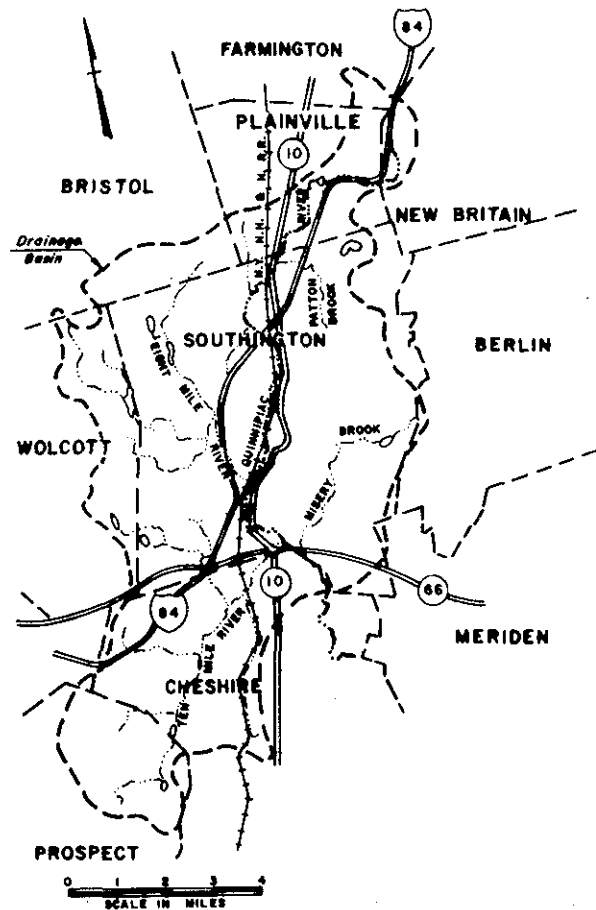


FLOOD PLAIN INFORMATION

QUINNIPIAC RIVER

SOUTHINGTON

CONNECTICUT



PREPARED FOR
THE TOWN OF SOUTHLINGTON, CONNECTICUT
BY
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS
JANUARY 1970

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INTRODUCTION

This report contains the results of an engineering study to determine the extent of flooding on the Quinnipiac River in Southington, Connecticut, during storms of selected magnitude and frequency of occurrence. The selection of storms and the data contained in this report are based upon a study of rainfall, runoff, past flood heights, local topography and other technical data which are pertinent to the frequency and extent of flooding on the Quinnipiac River.

The report does not include plans or proposals to eliminate flooding. Rather, it is intended to provide the basis for further study, planning and action by State and local interests to minimize and reduce flood damage. This might take the form of local planning programs to control the type and limits of development in the flood plain through the use of zoning and subdivision regulations. It might also involve the construction of flood protection works and/or physical improvements to the channel itself or a combination of the above programs.

Maps, profiles and cross sections which show the probable extent of flooding during storms of various magnitude are included in this report. From the profiles, the flood elevation at any location may be evaluated. This information will assist in designing floors for

buildings at elevations high enough to avoid flood damages or, if at lower elevations, with recognition of the chance and hazards of flooding that are being taken. This information will also assist the owners of existing buildings in determining whether windows, doors, or other openings located below the flood elevations should be permanently sealed or otherwise protected.

This report was requested by the Town of Southington through the Connecticut Water Resources Commission. It was prepared by Goodkind & O'Dea, Consulting Engineers, Hamden, Connecticut, for the United States Army Corps of Engineers, New England Division, Waltham, Massachusetts. Corps personnel will, upon request, provide technical assistance to State and local agencies in the use of the information contained herein and will provide other pertinent data which are available. The authority for this study was derived from Section 206 of the Flood Control Act of 1960 (P. L. 86-645) as amended.

The assistance and cooperation of numerous governmental agencies and private citizens in obtaining the basic data required for this study is gratefully acknowledged.

RIVER DESCRIPTION

The Quinpiac Valley lies in the physiological region called the Connecticut Lowland. The valley is quite broad and filled with horizontal terraces of sand, gravel and clay deposited by the melting of stagnant ice which overlaid the region during the last glacial period. The Quinpiac River meanders through these sand, gravel and clay deposits along the westerly side of the valley. The geology of any watershed, particularly as applied to surface materials, is of importance in considering runoff characteristics. Pervious soils, such as sand and gravel, can absorb considerable rainfall by infiltration until saturated. Frozen, clayey soils or ledge rock close to the surface resist the infiltration of rain and contribute to a large and rapid runoff of rainfall.

This report covers approximately 10.6 miles of the Quinpiac River as it flows through the Town of Southington in a generally north-south direction from the Plainville Town Line in the north to the Cheshire Town Line in the south. See Plate No. 1. The drainage area contributing to the flow in the Quinpiac River at the Plainville Town Line is 6.0 square miles. The four major tributaries, which contribute to the flow as the Quinpiac River passes through Southington, and their respective drainage areas are: Patton Brook - 4.0 square miles, Eight Mile River - 14.1

square miles, Ten Mile River - 20.2 square miles and Misery Brook - 7.1 square miles. The latter three tributaries discharge into the Quinnipiac River south of West Main Street in the Plantsville section of Southington. At the Cheshire Town Line, the total drainage area is 63.6 square miles. From the Plainville Town Line to the Cheshire Town Line, the river bottom drops a total of 52.5 feet for an average slope of 5 feet per mile.

Throughout the area of study, the Quinnipiac River is characterized by a narrow channel incised 4 to 6 feet in a broad flood plain. In general, the river banks support a very heavy growth of weeds and brush. In the northern section of town, there are areas where the brush has grown completely across the channel. Numerous trees are growing in and immediately adjacent to the channel and in several locations dead tree trunks have fallen into the river and act as small dams as floating debris becomes lodged against the fallen trunk. See photos #1 & #2.

At the time of this study, there were 20 bridges, 2 box culverts, and 1 stone arch which carry vehicular and railroad traffic across the Quinnipiac River. See photos #3 thru #9. All of the existing crossings create a restriction to flood flow to some degree because of the need to build the approaches on fill



Photo #1. View of channel looking upstream from Johnson Avenue in Cheshire. Note the heavy vegetative growth on the river banks.



Photo #2. View of fallen tree completely across river just south of Meriden - Waterbury Turnpike. Floating debris is being trapped here and a small dam has been created.



Photo #3 . View of West Main Street bridge looking downstream.

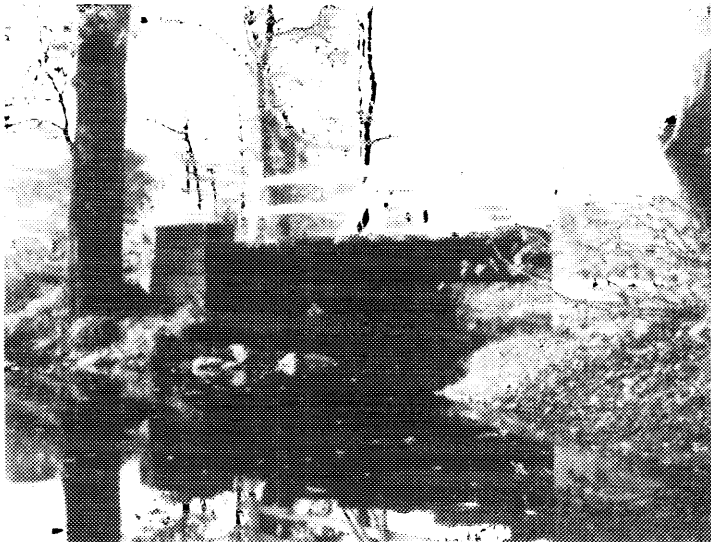


Photo #4 . View of Hart Street bridge looking upstream.
This is a small, narrow, low bridge with an inadequate waterway opening.

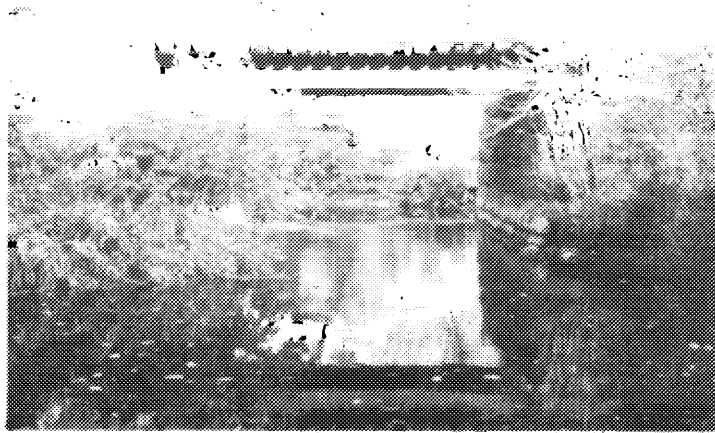


Photo #5 . View of railroad bridge at station 375+00, looking upstream.



Photo #6. View of railroad arch at station 433+00, looking downstream.

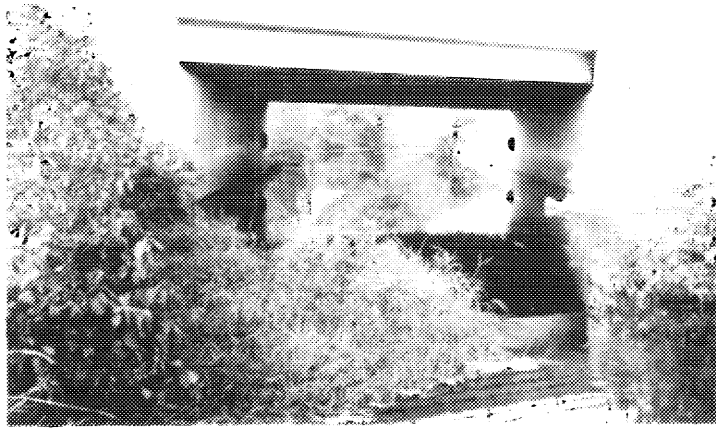


Photo #7 . View of Spring Street bridge looking upstream. Note heavy growth on banks, particularly upstream of bridge.



Photo #8 . View of West Queen Street bridge looking upstream.



Photo #9 . View of Newell Street bridge looking upstream. Silt in foreground has been washed downstream from recent construction upstream.

in the flood plain and to construct piers and abutments in and adjacent to the stream bed. The newer bridges form less of a restriction and are less susceptible to blockage from floating debris than the older bridges. However, the effective waterway opening on several bridges, both new and old, has been reduce by utility pipelines crossing the river under the roadway of the bridge. See photos #10 and #11.

In addition to the vehicular and rail crossings indicated above, there are three pipe crossings and numerous private bridge crossings for pedestrians and farm equipment. Two of the pipe crossings and several of the private bridge crossings form definite restrictions to flood flow and are highly susceptible to blockage from floating debris. See photos #12 and #13. At the time of this study, the closely spaced concrete piers supporting the pipe crossing 500 feet south of Atwater Street were completely blocked with debris and the entire structure was acting as a small dam. See photo #14.

In the past, development in the flood plain has been limited in the most part to industrial structures. In fact, some of these industrial structures are so close to the channel that the walls of the buildings form the sides of the channel. See photo #15. With the increasing demand for land in our urban areas, residential, commercial and new industrial development have taken place in

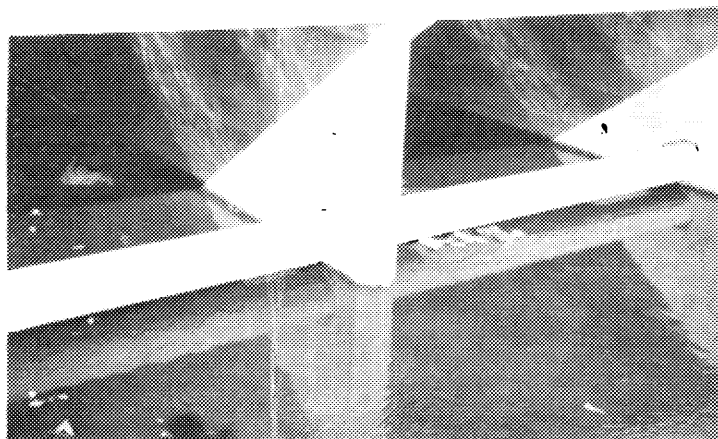


Photo #10. View of utility pipe just above water surface at the Mill Street bridge. Note debris lodged under pipe.

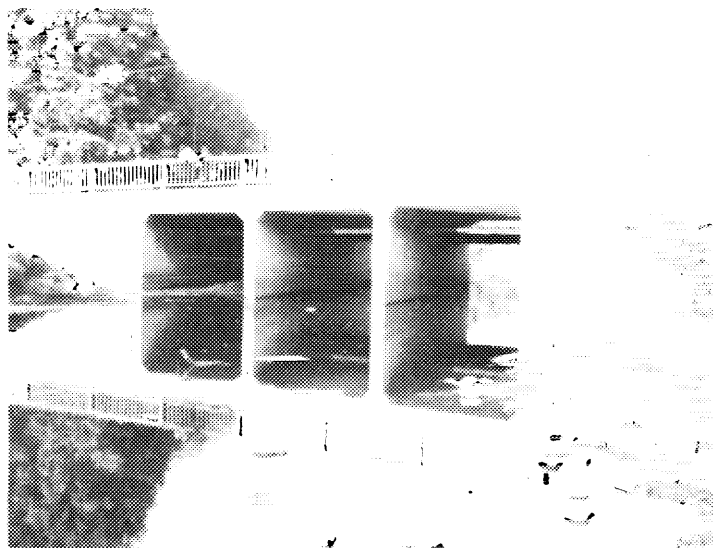


Photo #11. View of Curtiss Street bridge looking upstream. Note two exposed utility pipes in waterway opening.

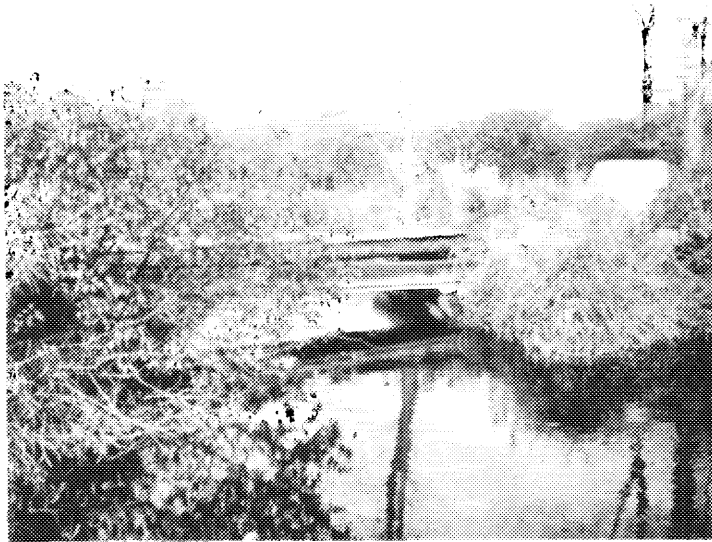


Photo #12. View of sewer pipe and supporting channels at station 338+00 with pole and plank footbridge in the background, both susceptible to blockage from floating debris.



Photo #13. View of private bridge crossing at station 126+00. Note collection of logs and other debris at this bridge.



Photo #14. View of sewer pipe crossing 500 feet south of Atwater Street. The closely spaced concrete piers have prevented the passage of floating debris and the entire structure is acting like a small dam.

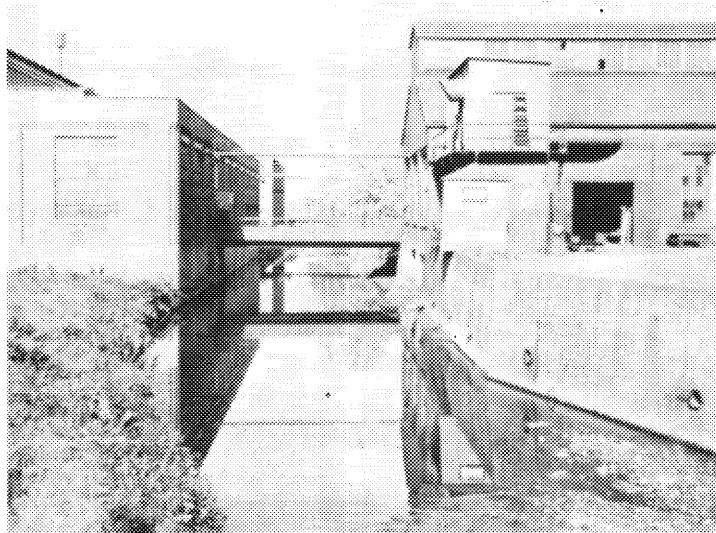


Photo #15. View looking upstream from Center Street. Industrial building walls form the sides of the channel in this area.

the Quinnipiac flood plain in Southington in recent years. This development has been in the form of structures and/or land fill to create more useable land for parking and other purposes. The filling of land and the construction of permanent structures in a flood plain creates restrictions and reduces the ability of that plain to carry a flood flow. The velocity of flow and, therefore, the river's destructive capabilities are increased at each restriction. Another result of a restriction to flow is called backwater, a higher elevation of the water surface upstream from a restriction than would normally occur if there were no restriction.

A dam will also raise the elevation of the water surface upstream from the dam. A picture of a dam no longer being used for the purpose for which it was constructed is shown in photo #16.

It is, therefore, apparent from the preceeding description of the river channel and photos #1 thru #16, that man and nature have contributed to making the passage of a flood on the Quinnipiac River through Southington a torturous experience. A relatively flat channel slope, heavy growth of weeds and brush on the river banks and natural and man-made obstructions to stream flow, both in the channel and in the flood plain, have all contributed to reducing the flood handling capabilities of the existing channel.

It must be kept in mind when determining the type and extent of development to be allowed in a flood plain, that the flood plain was created centuries ago by the river for its use in times of heavy runoff. When a river is forced to leave its normal channel because of the quantity of water it is required to carry, it is not invading man's domain but rather it is claiming its real estate right to the flood plain. Man has invaded the river's domain with his developments in the flood plain and consequently must be prepared to face the consequences.

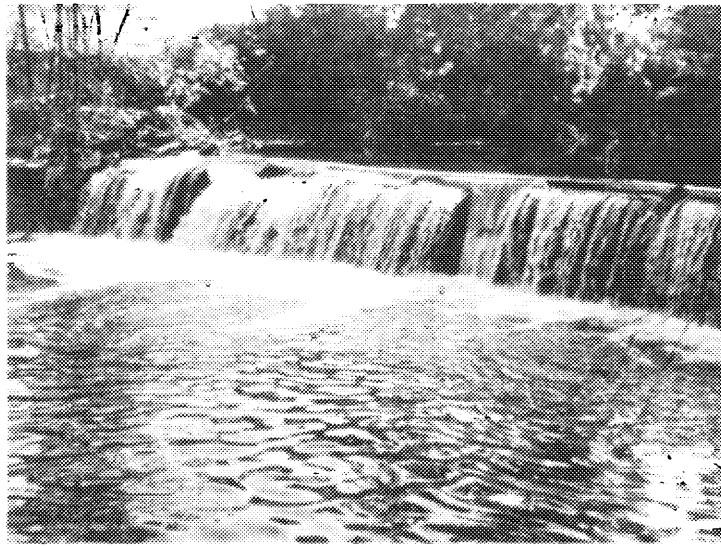


Photo #16. View of small dam at station 173+00.

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PAST FLOODS

Old newspaper accounts and other historical records indicate that major floods have occurred on the Quinnipiac River in Southington in 1854, 1869, 1882, 1891, 1927, 1936, 1938 and 1955. Storms of hurricane proportion have been recorded in the Southington area as far back as 1635. Other hurricanes are reported to have hit the Southington area in 1788, 1815, 1821, 1869, 1878, 1893, 1903, 1938 and 1955. It is, therefore, apparent that hurricanes are not the only cause of flooding on the Quinnipiac River in Southington.

The U. S. Geological Survey has maintained a stream flow measuring station on the Quinnipiac River in Wallingford, Connecticut from October, 1930 to date. The flow past this station represents the runoff from a drainage area of 109 square miles. The four largest flows on the Quinnipiac River as measured at this gaging station are:

5230 cubic feet per second (cfs) - September 21, 1938

3790 " " " " " - August 20, 1955

3000 " " " " " - October 17, 1955

2680 " " " " " - March 12, 1936

The two greatest floods of record, September, 1938 and August, 1955 were caused by rainfall associated with hurricanes of

tropical origin. The third largest flood of record, the flood of October, 1955 was a storm of tropical origin but without hurricane force winds. The flood of March, 1936, the fourth largest flood of record, was associated with an early spring storm of continental origin coupled with snowmelt. Melting snow alone seldom produces damaging flood levels but may augment rainfall runoff, particularly in the early spring when the ground may still be frozen.

The greatest flood in Southington, according to eyewitness accounts, occurred in August, 1955 and was the result of heavy rainfall associated with hurricanes Connie and Dianne. It is estimated that 4 inches of rain fell on the 12th and 13th during hurricane Connie and 14 inches fell on the 18th and 19th during hurricane Dianne. Downstream, however, at the Wallingford gaging station, the greatest flow was recorded in September, 1938.

In September, 1938, the Quinnipiac River basin experienced flooding as a result of heavy rainfall associated with the Great New England Hurricane of 1938. Flooding was the greatest in the lower Quinnipiac basin but in the Southington area the storm resulted in the 2nd largest flood of record. Moderately heavy rain fell on the 13th and 15th and then during the 5 day period from the 17th to the 21st, rain fell almost continuously at excessive rates. Total rainfall for the

9-day period from the 13th to the 21st varied from 10 to 14 inches throughout central Connecticut.

In October, 1955, the Quinnipiac River basin again experienced flooding as a result of heavy rainfall associated with a storm of tropical origin. Rainfall from the 15th to the 17th averaged 11 inches in the Southington area and resulted in the 3rd largest flood of record.

During all of the floods discussed above, the damage and economic loss in the Southington area were relatively minor as compared to the damage and havoc created in other areas of Connecticut from the same storms. Some of the factors which may have contributed to this are:

1. Lack of extensive development in the flood plain north of Mill Street;
2. The small drainage area discharging runoff to the Quinnipiac River as it enters Southington (6 square miles);
3. The three largest tributaries enter the Quinnipiac River downstream from the more densely developed areas in town. (i. e. The drainage area of the Quinnipiac River at the Cheshire Town Line is 63.6 square miles but only 19.1 square miles at West Main Street in the Plantsville section);
4. The geological nature of some of the soil in the Quinnipiac River valley which permits rapid absorption of rainfall into the soil. (This factor can be nullified by frozen or saturated

ground conditions);

5. The relatively flat slope of the river bottom which results in storage by ponding in swamps and other low areas in the broad flood plain characteristic of the Quinnipiac River.

SELECTED FLOODS FOR STUDY

The extent and depth of flooding created by three floods of varying magnitude and frequency of occurrence were investigated in this study. The results of these hydraulic investigations are shown pictorially on the Flood Plain and Profile drawings attached to this report. The three floods studied have been labeled the Standard Project Flood, the Intermediate Regional Flood and the 50 Year Flood.

The largest flood that is likely to occur on a specific stream or river has been experienced only in rare instances, if at all. It is an accepted fact that, as severe as the maximum known flood may have been, sooner or later a larger flood can and probably will occur. The Corps of Engineers, in cooperation with the Weather Bureau's Hydro-meteorological Section, has developed generalized procedures for estimating the flood potential of streams. These procedures, which are based on extensive records of experienced storms and floods and other studies and investigations, have been used to determine the Standard Project Flood in this report. It can be defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area involved. The occurrence of such a flood would be a rare event; however, with the right combination

of meteorological and hydrological conditions, it could occur at any time.

The Intermediate Regional Flood is approximately equal in magnitude to the 100 Year Flood. Both the 100 and 50 Year Floods are based on a statistical analysis of past floods on the Quinnipiac River and other rivers with similar characteristics. The assignment of a 100 or 50 year frequency to a flood does not indicate the anticipated interval between floods of that magnitude. Rather, the assignment indicates that over any given 500 year period of time, a flood equal to or greater than the 100 year flood will occur on the average of 5 times and a flood equal to or greater than the 50 year flood will occur on the average of 10 times. In other words, in any given year, there is a 1% chance of occurrence for a 100 year flood and a 2% chance of occurrence for a 50 year flood; however, either flood could occur more than once in the same year.

The magnitude of flow expected during the Standard Project Flood, the Intermediate Regional Flood and the 50 Year Flood and the estimated flow during the August, 1955 flood are tabulated below for comparison purposes at different locations in Southington. (All flows indicated are in cubic feet per second).

Location	50 Year Flood	Intermediate Regional Flood	August 1955 Flood	Standard Project Flood
Cheshire Town Line	1890	2500	2720	3540
South Main Street	1235	1640	1780	2320
West Main Street	815	1080	1170	1530
Mill Street	740	980	1065	1385
Spring Street	635	840	915	1190
Newell Street	575	760	830	1080
Plainville Town Line	360	480	525	680

As can be seen from the above tabulation, the August, 1955 flood was slightly larger than the Intermediate Regional Flood on the Quinnipiac River in the Southington Area; however, the areas inundated would be about the same for both floods because of the broad, relatively flat flood plain. This will help local residents appreciate the magnitude of the Intermediate Regional Flood, which, as has been previously stated, has a 1% chance of recurring each year and could indeed occur more than once in the same year.

FUTURE FLOODS

Floods of the size of the Standard Project Flood represent reasonable upper limits of expected flooding. Those of the size of the Intermediate Regional Flood represent floods that may reasonably be expected to occur more frequently, although they will not be as large in magnitude as the infrequent Standard Project Flood.

Floods larger than the Standard Project Flood are possible; however, the combination of factors that would be necessary to produce such floods would seldom occur. The consideration of floods of this magnitude is of greater importance in some problems than in others but should not be overlooked in the study of any problem.

The areas along the Quinnipiac River flooded by the Standard Project Flood and the Intermediate Regional Flood are shown on Plates 2 through 7. Depth of flow can be determined from the profiles which are shown on the same plates.

The Intermediate Regional Flood profile for the Quinnipiac River is about the same as the August, 1955 flood profile. The Standard Project Flood is about 2 feet higher than the Intermediate Regional Flood downstream of Mill Street and about 4 feet higher upstream of Mill Street.

Quinnipiac River Crossings

Sta- tion	Identification	River Bottom Elev.	Roadway or Track Elev.	Inter Regional Flood			Standard Proj. Flood		
				Water Surface Elev.	Depth below roadway	Height above roadway	Water Surface Elev.	Depth below roadway	Height above roadway
70+50	Mer. - Wtby. Tpk.	109.0	123.5	123.2	0.3'	-----	124.7	-----	1.2'
138+00	Old Turnpike	114.0	132.5	124.5	8.0'	-----	126.2	6.3'	-----
170+00	South Main Street	115.5	127.5	126.5	1.0'	-----	129.5	-----	2.0'
190+50	Rte. 10 Conn. E. B.	120.5	155.0	128.7	26.3'	-----	130.1	24.9'	-----
192+00	Rte. 10 Conn. W. B.	120.5	160.0	128.7	31.3'	-----	130.1	29.9'	-----
204+50	Atwater Street	120.5	136.0	130.8	5.2'	-----	132.6	3.4'	-----
253+00	West Main Street	128.5	140.5	137.5	3.0'	-----	138.7	1.8'	-----
289+00	R. R. Bridge	135.0	145.8	144.0	1.8'	-----	146.3	-----	0.5'
304+00	West Center Street	138.0	147.5	146.8	0.7'	-----	148.0	-----	0.5'
313+00	Center Street	139.5	148.0	147.8	0.2'	-----	149.3	-----	1.3'
323+00	Mill Street	139.0	149.0	149.0	-----	-----	151.4	-----	2.4'
367+00	Hart Street	141.5	149.0	151.3	-----	2.3'	155.2	-----	6.2'
373+00	Curtiss Street	141.5	153.0	151.5	1.5'	-----	155.5	-----	2.5'
375+00	R. R. Bridge	141.5	155.0	152.2	2.8'	-----	156.4	-----	1.4'
415+50	Lazy Lane	145.0	154.5	153.0	1.5'	-----	156.6	-----	2.1'
427+25	Pipe Bridge	145.0	161.5	155.0	6.5'	-----	158.0	3.5'	-----
433+00	R. R. Arch	148.5	161.5	156.3	5.2'	-----	160.3	1.2'	-----
443+00	I84 E. B.	148.5	178.0	156.5	21.5'	-----	160.3	17.7'	-----
445+00	I84 W. B.	148.5	177.5	156.7	20.8'	-----	160.4	17.1'	-----
458+50	Spring Street	151.0	164.0	157.2	6.8'	-----	160.7	3.3'	-----
501+50	West Queen Street	153.5	162.0	161.0	1.0'	-----	163.5	-----	1.5'
519+25	Newell Street	156.00	163.5	161.8	1.7'	-----	164.5	-----	1.0'
542+25	R. R. Bridge	158.0	168.0	164.5	3.5'	-----	166.3	1.7'	-----
545+00	Queen Street	157.5	171.0	163.7	6.3'	-----	166.7	4.3'	-----

There are 20 bridges, 2 box culverts, 1 arch and 3 pipe crossings, that span the Quinnipiac River in the reach included in this study. The preceeding table lists pertinent elevations for most of these structures and shows their relationship to the Standard Project Flood and the Intermediate Regional Flood.

A review of this table and the plans and profiles of the flood plains indicates that 12 of the existing structure openings will pass a flood equal in magnitude to the Standard Project Flood providing they are not blocked by debris. Only 1 of the structures listed, Hart Street, will be inundated by a flood equal in magnitude to the Intermediate Regional Flood but in several other areas a flood of this magnitude would make the approaches to bridges impassable. Twelve of the structure openings, however, will be underwater during a flood equal in magnitude to the Standard Project Flood.

It should be noted that the limits of inundation indicated on plates 2 thru 7 are only approximate but are consistent with the purposes of this study and the accuracy of the basic data used herein. Standard survey methods can be utilized to determine the depth of flooding at any location along the River with the information shown on the Flood Plain and Profile drawings.

On streams as small as the Quinnipiac River through Southington, the Weather Bureau is unable to provide flood-warning services similar to those provided for larger drainage basins. The most that can be expected from the Weather Bureau at Bradley Field would be a regional

forecast indicating "possible flooding of small streams in central Connecticut." With this type of warning, the local Police Department and/or Civil Defense office would be on an alert status and industries and individuals whose properties are subject to flooding can take precautionary measures.

At the present time, neither the Town of Southington nor the Central Connecticut Regional Planning Agency have zoning regulations concerning development in the flood plain of the Quinnipiac River. The State of Connecticut Water Resources Commission has the authority and is currently in the process of establishing encroachment lines along the Quinnipiac River. The aim of such regulations would be to establish the best long range use of land in the flood plain consistent with the need to maintain an adequate waterway to carry flood flows. Control of future developments will also ensure that the risk of flood damage to existing development is not increased.

Physical improvements to the channel itself will, in general, reduce flood damages by lowering the water surface. These improvements might take the form of channel straightening, widening, and/or deepening and might also include the removal of damaged or abandoned dams. Periodic maintenance to remove debris and fallen trees and constant surveillance of the stream and flood plain to prevent unauthorized filling will all improve the flood handling capabilities of the existing channel.

and thereby reduce flood damages. It is also essential that bridge openings be kept clear of debris and excessive vegetative growth at all times.

Photos 17 thru 20 indicate the heights that would be reached by the study floods on buildings now constructed within the flood plain.



Photo #17. Flood heights at pumping station on Meriden
- Waterbury Turnpike.

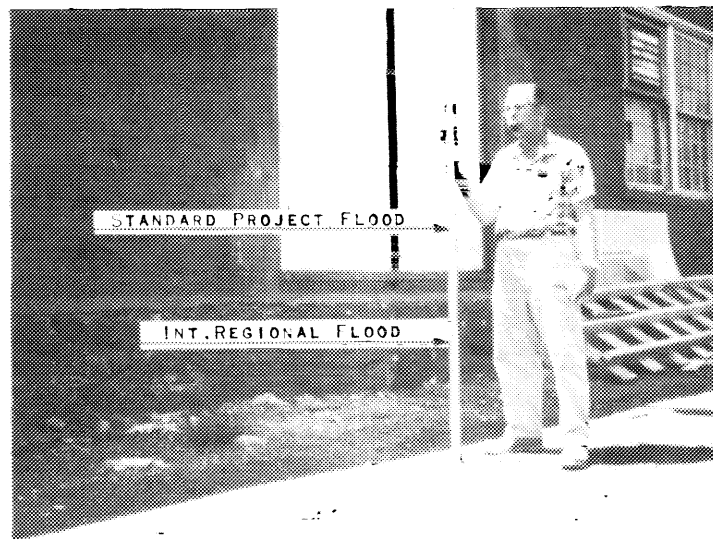


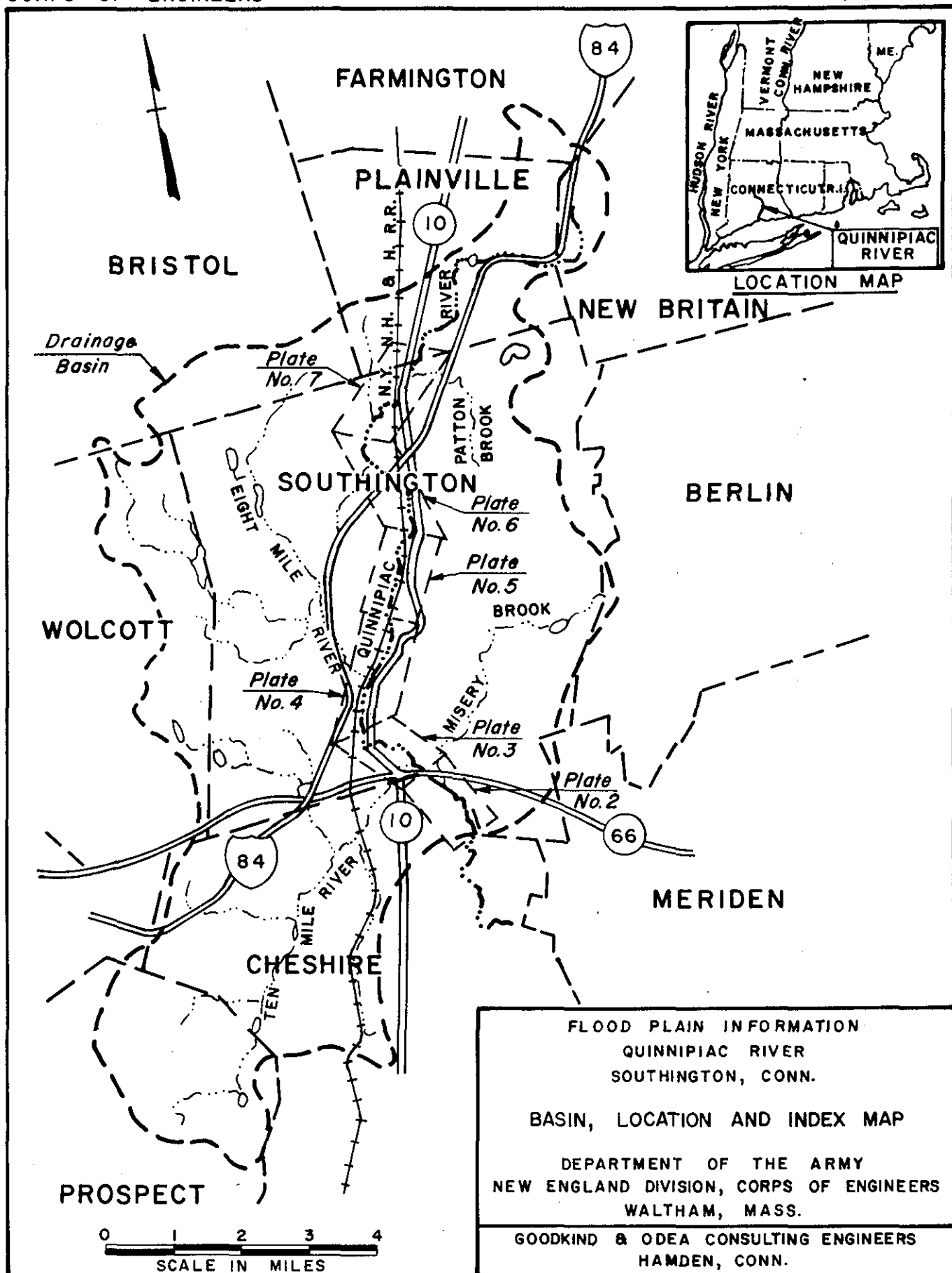
Photo #18. Flood heights at Alsop building on South Main
Street.

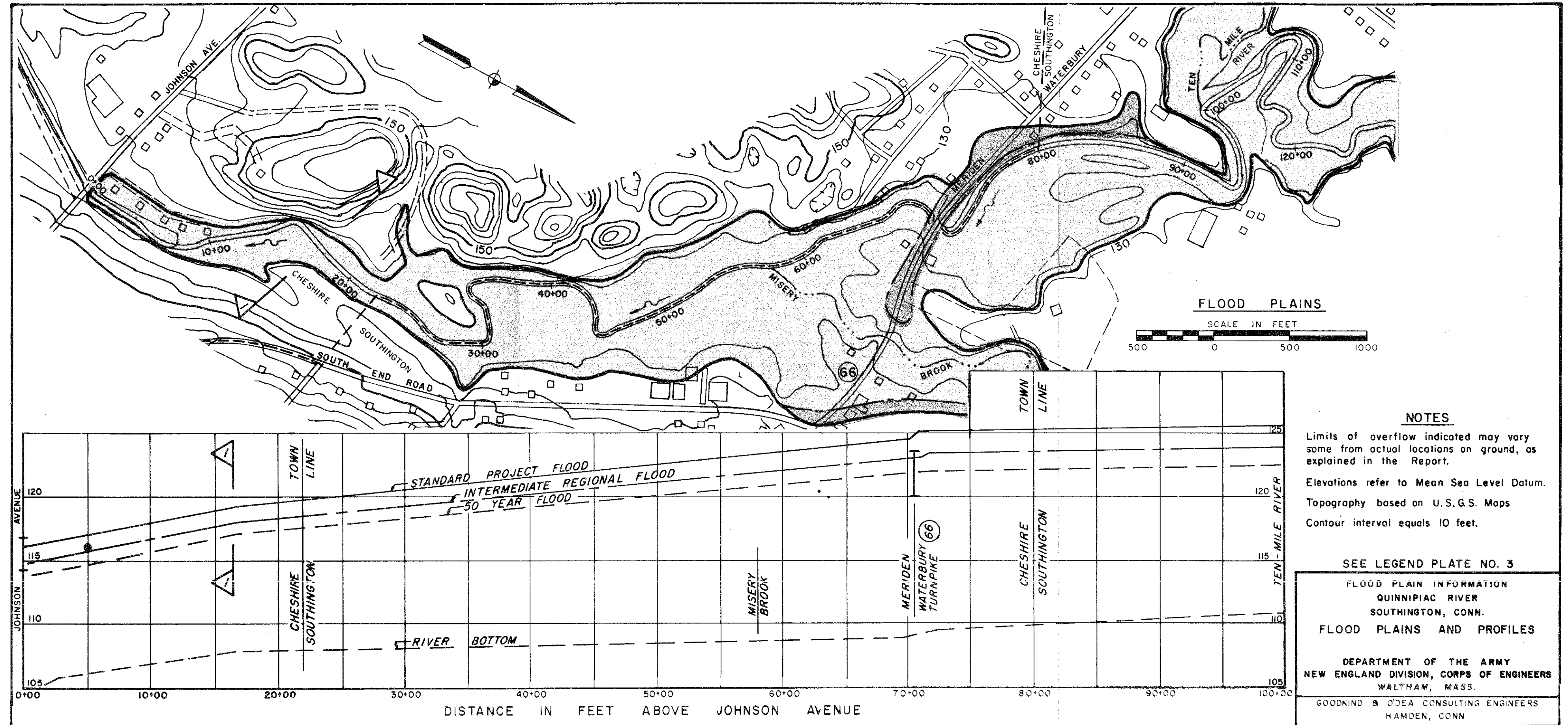


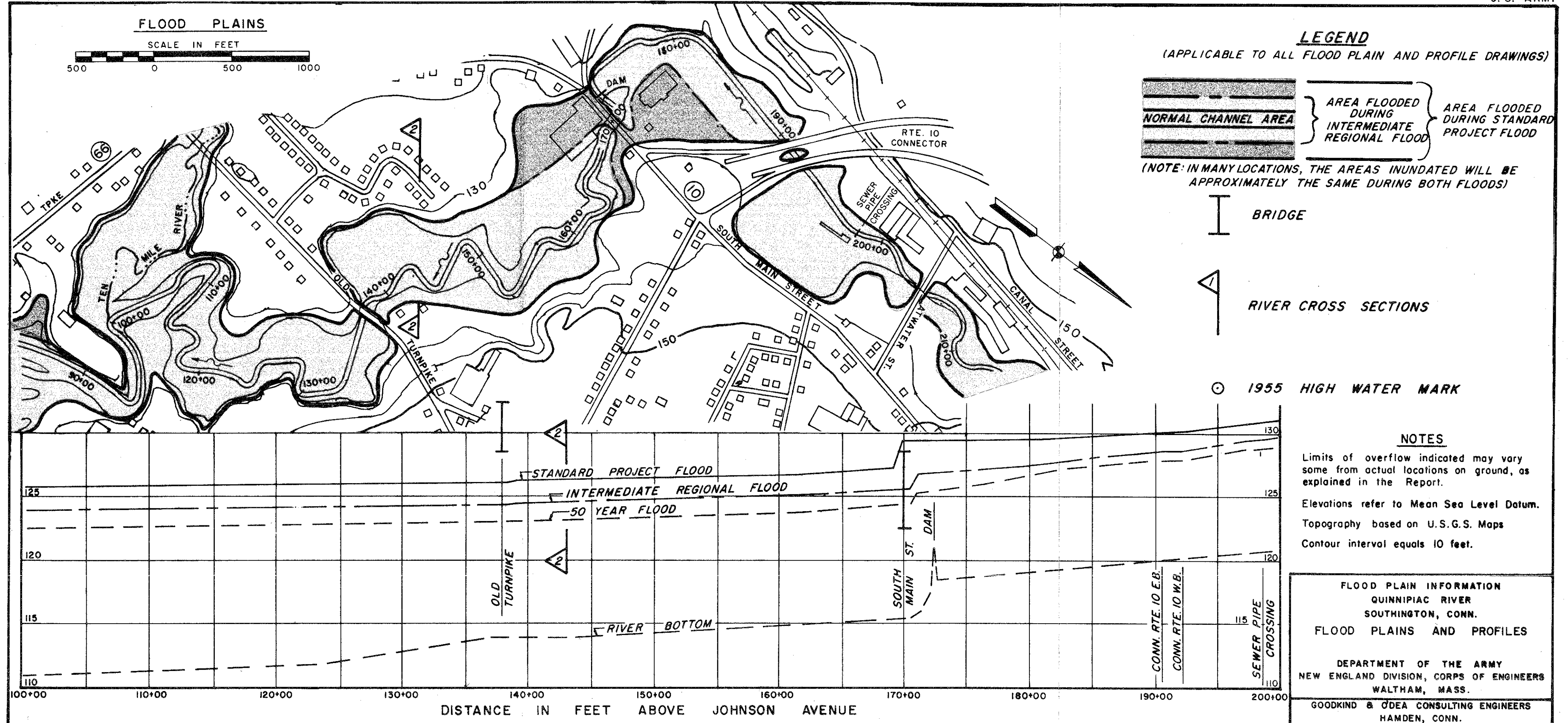
Photo #19. Flood heights at Pexto building on Center Street.

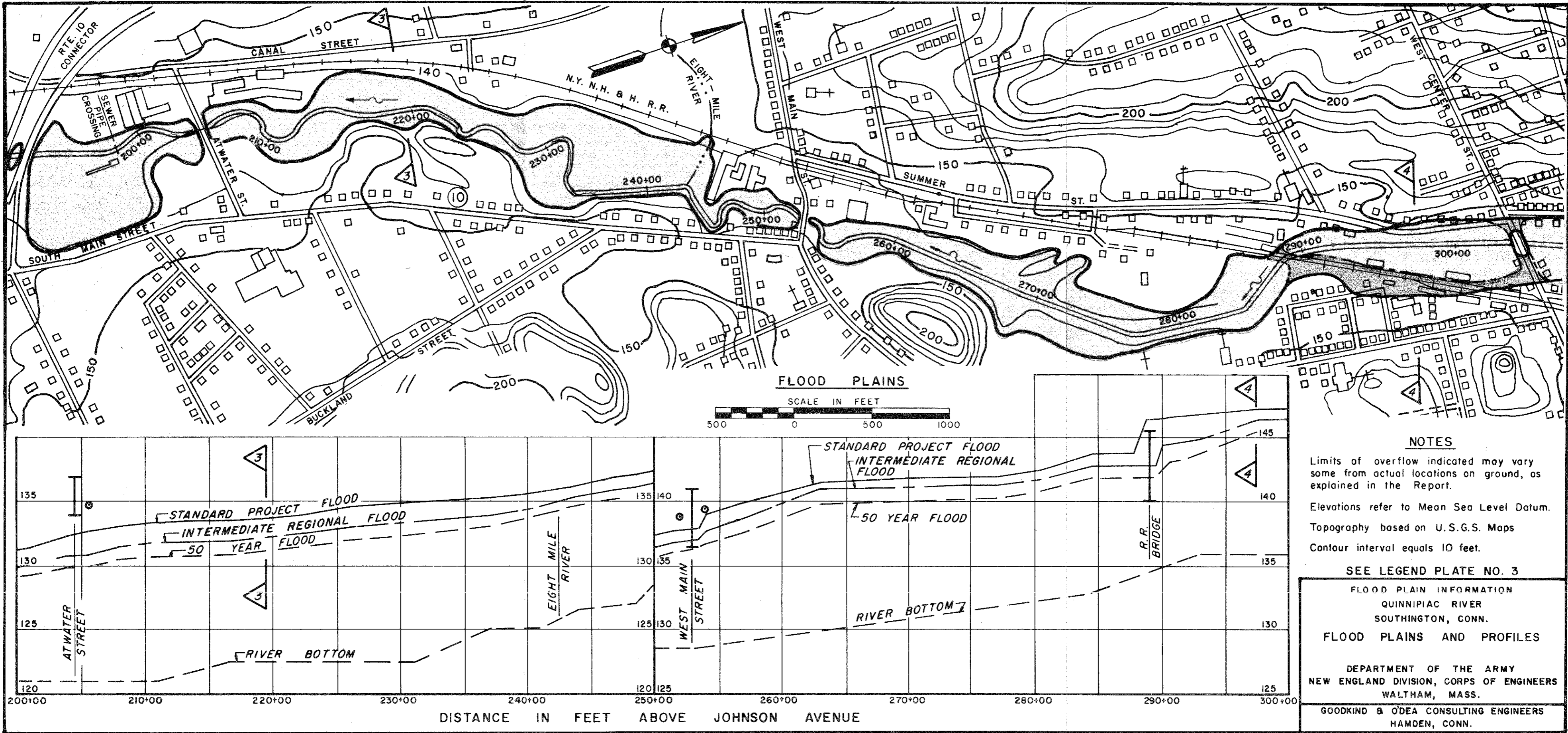


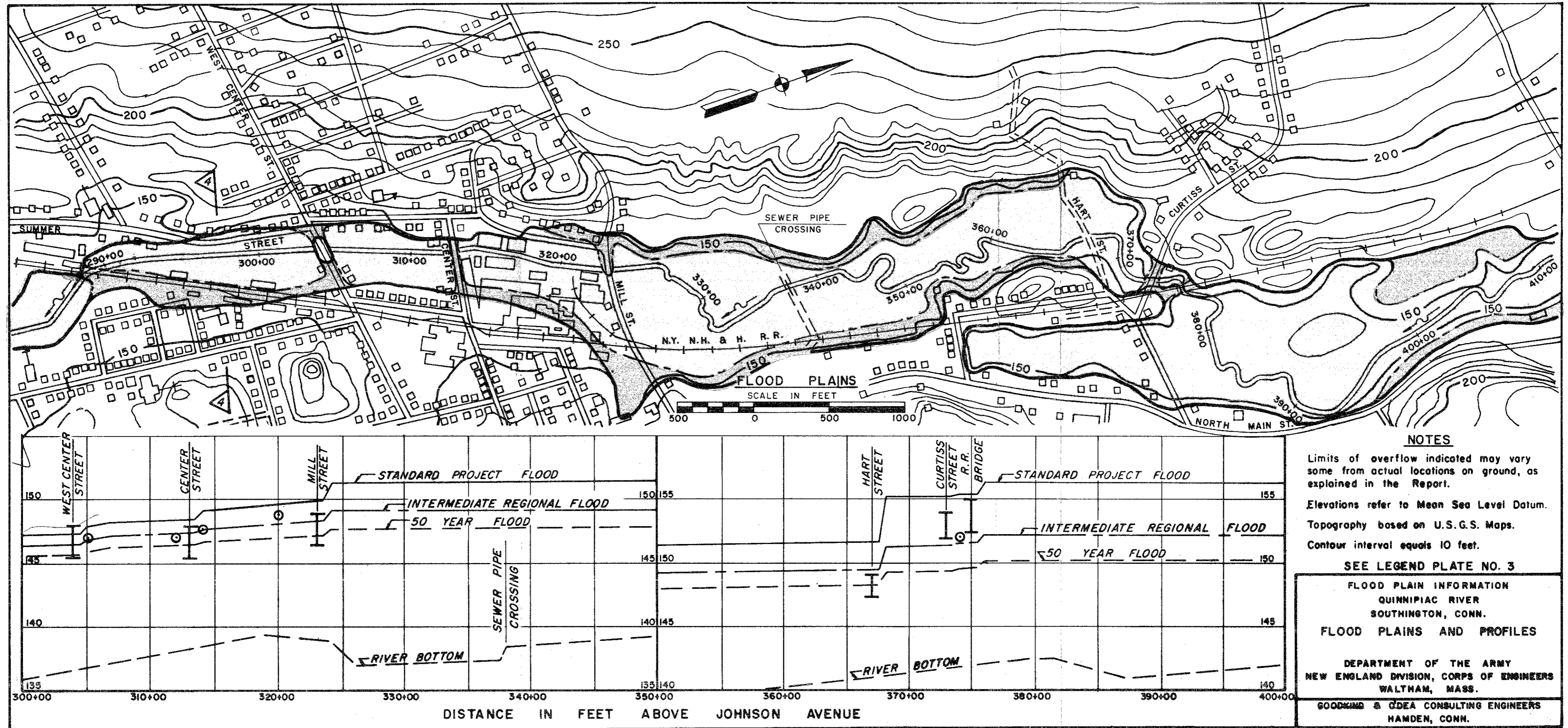
Photo #20 . Flood heights at Moose Club on Curtiss Street.

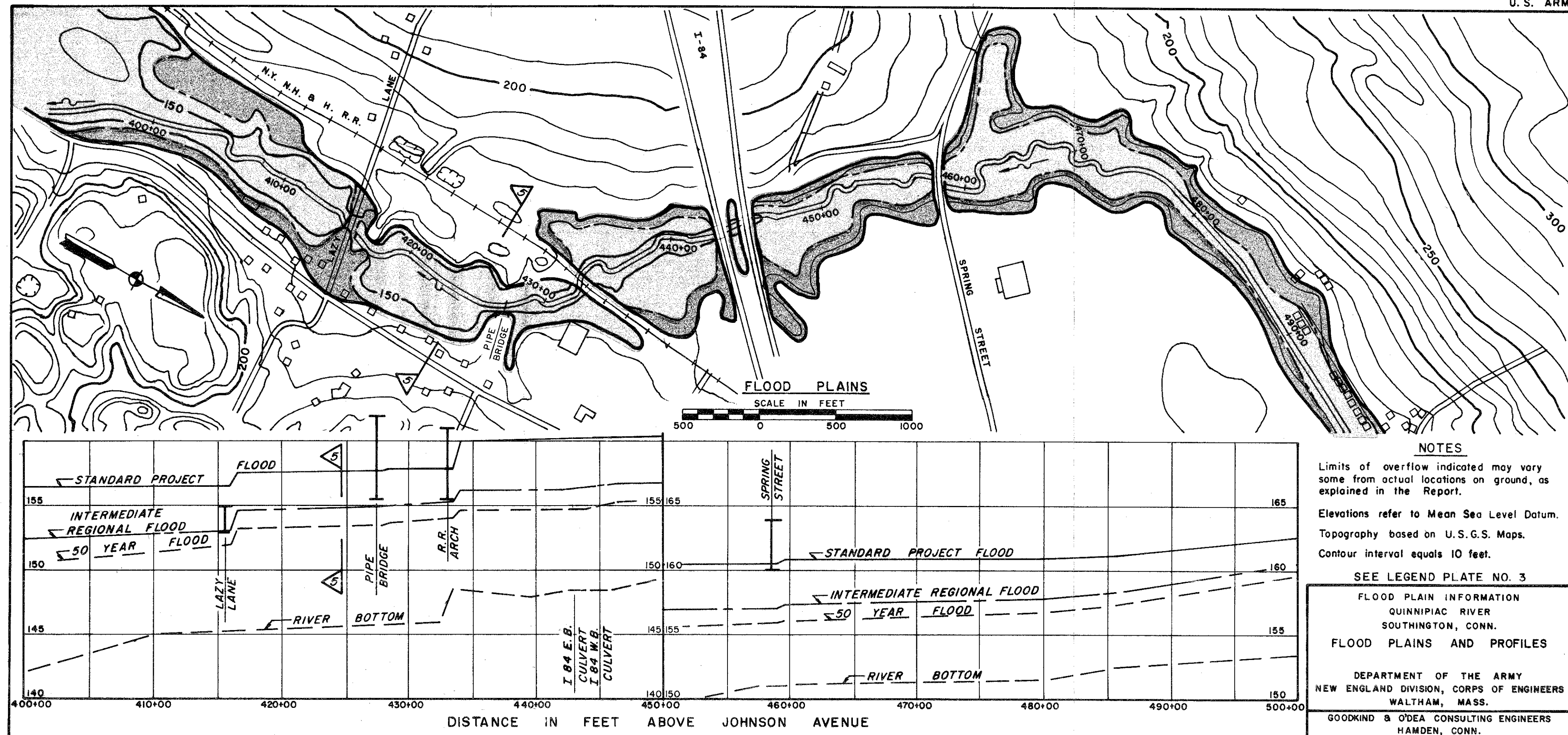


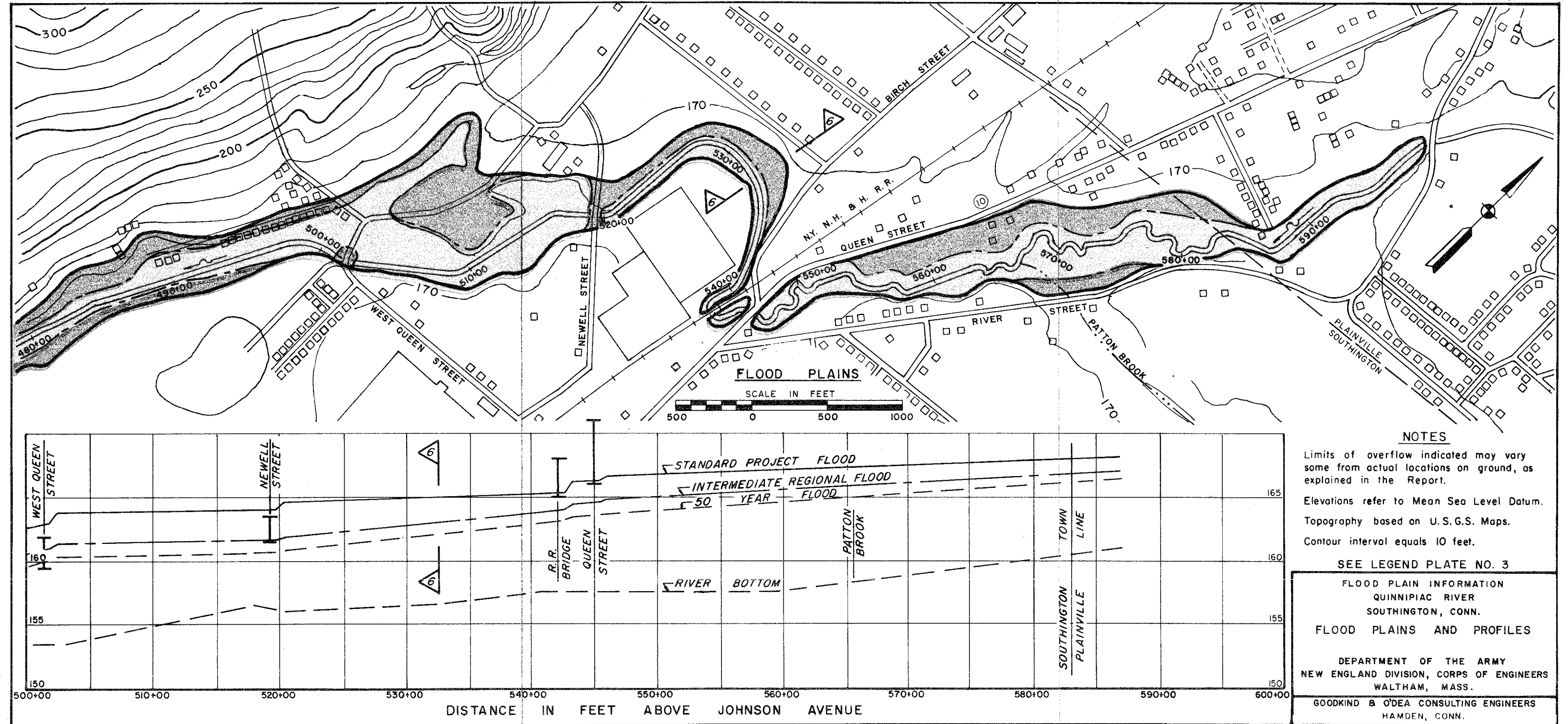


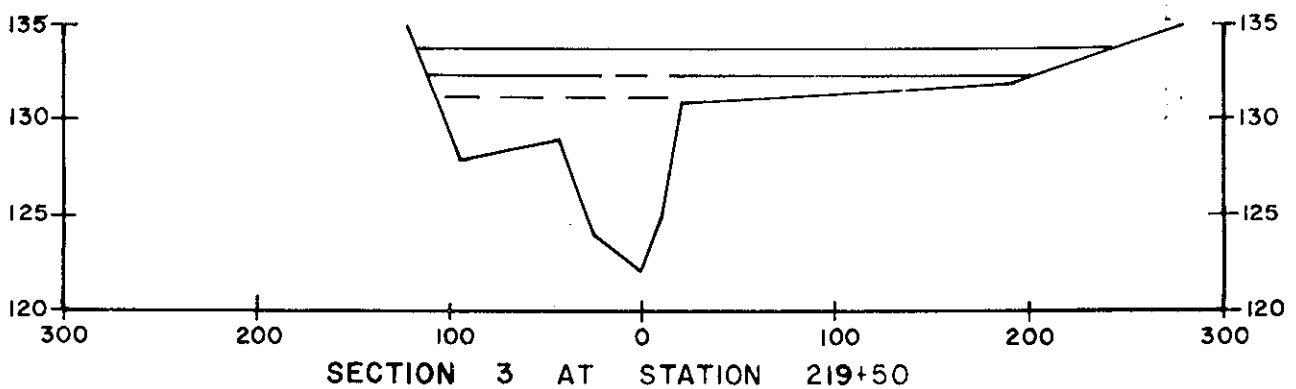
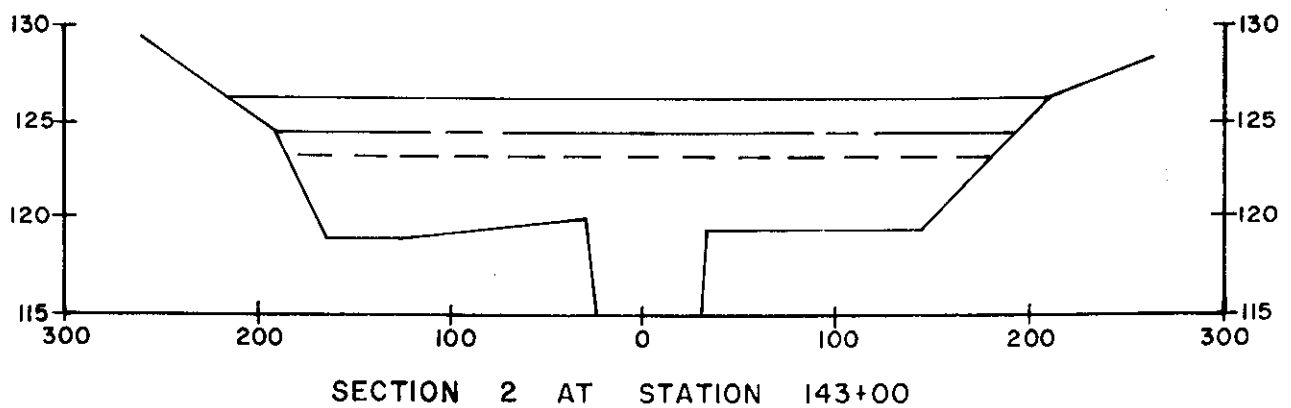
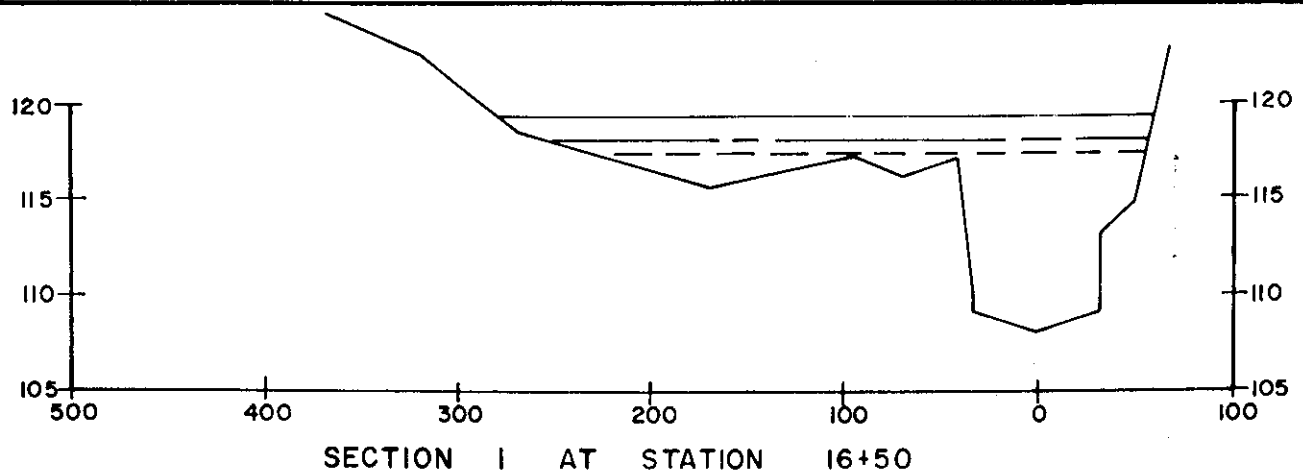












Notes

Sections taken looking downstream
Horizontal distances and elevations
in feet (Mean Sea Level Datum)

Legend

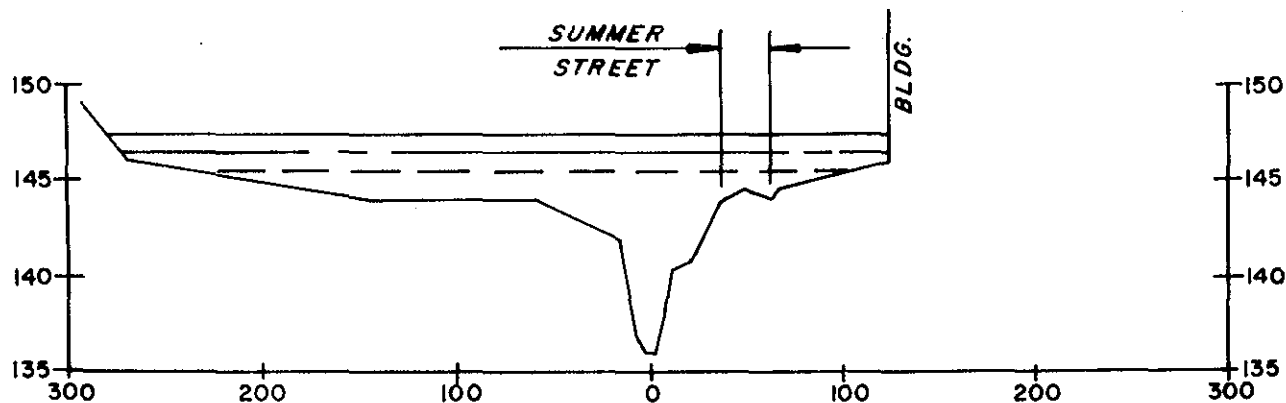
- 50 Year Flood
- . - . - . 100 Year Flood
- Standard Project Flood

FLOOD PLAIN INFORMATION
QUINNIPIAC RIVER
SOUTHINGTON, CONN.

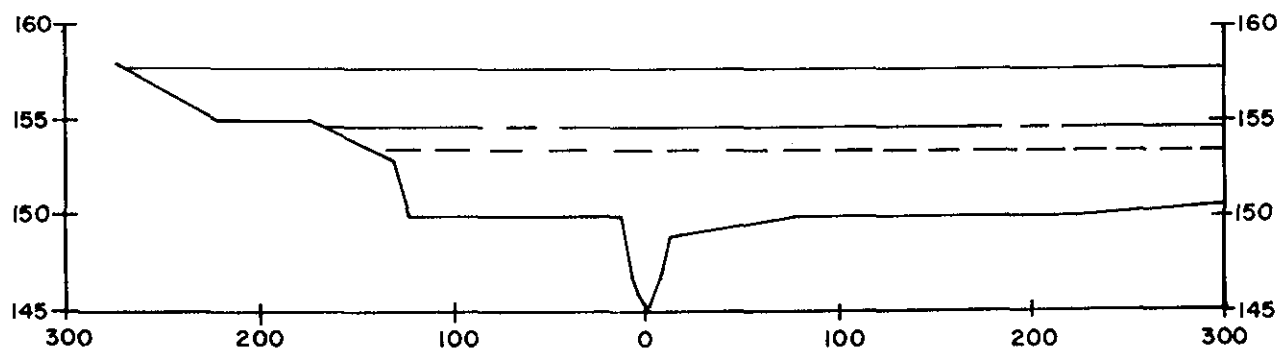
TYPICAL CROSS SECTIONS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

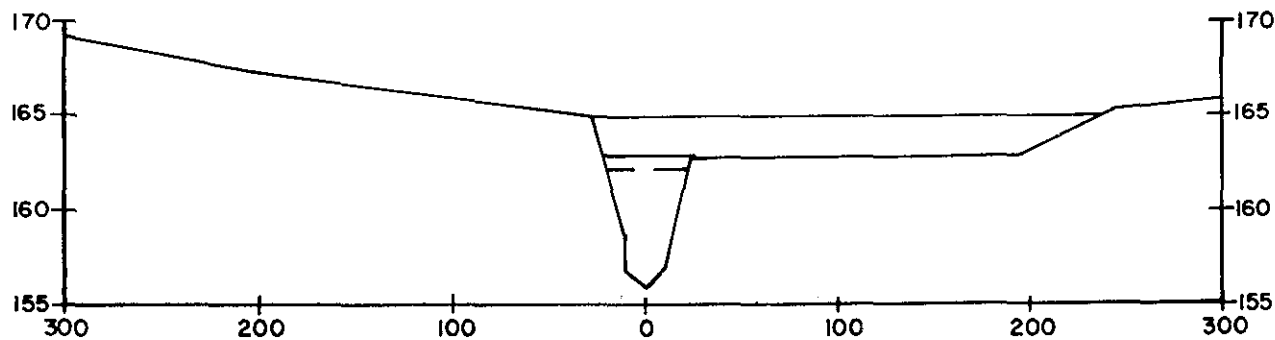
GOODKIND & O'DEA CONSULTING ENGINEERS
HAMDEN, CONN.



SECTION 4 AT STATION 297+50



SECTION 5 AT STATION 424+50



SECTION 6 AT STATION 532+50

Notes

Sections taken looking downstream
Horizontal distances and elevations
in feet (Mean Sea Level Datum)

Legend

- 50 Year Flood
- 100 Year Flood
- Standard Project Flood

FLOOD PLAIN INFORMATION
QUINNIATIC RIVER
SOUTHINGTON, CONN.

TYPICAL CROSS SECTIONS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

GOODKIND & O'DEA CONSULTING ENGINEERS
HAMDEN, CONN.